Spin-Reversals in the X-ray Binary Pulsar OAO 1657-415

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OAO 1657-415 is an X-ray binary pulsar that exhibited a long-term spin-up trend with short-term torque reversals in the past. In this work we present over 10 years of data from Fermi/GBM and Swift/BAT to study the long-term spin behavior and the torque-flux relation of this source, using current accretion torque models. The frequency history shows that the source is no longer on a spin-up trend but has settled in an equilibrium spin period of about 27 mHz with short-term spin-reversals. The analysis of the torque-flux relation shows a correlation when the source is spinning up, indicating that matter is likely accreted from a stable accretion disk. The observations during the spin-down of the pulsar could be explained by accretion from a retrograde disk or a sub-Keplarian behavior of the disk. The accretion process in this regime, however, remains elusive. A domain where the torque is close to zero has also been observed with a highly scattered flux, which could be explained by direct accretion from the stellar wind of the companion.

Topic
Compact and diffuse sources in galaxies and in the Galactic Center

Affiliation
IAAT, University of Tuebingen

Primary author: Ms SAATHOFF, Inga (IAAT, University of Tuebingen)
Co-authors: Dr DUCCI, Lorenzo (IAAT, University of Tuebingen); Prof. SANTANGELO, Andrea (IAAT, University of Tuebingen)
Presenter: Ms SAATHOFF, Inga (IAAT, University of Tuebingen)
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